FOREST PEST MANAGEMENT

UNITED STATES
DEPARTMENT OF
AGRICULTURE

FOREST SERVICE

NORTHEASTERN AREA

1984 NURSERY REPORT

Field Note 85-6

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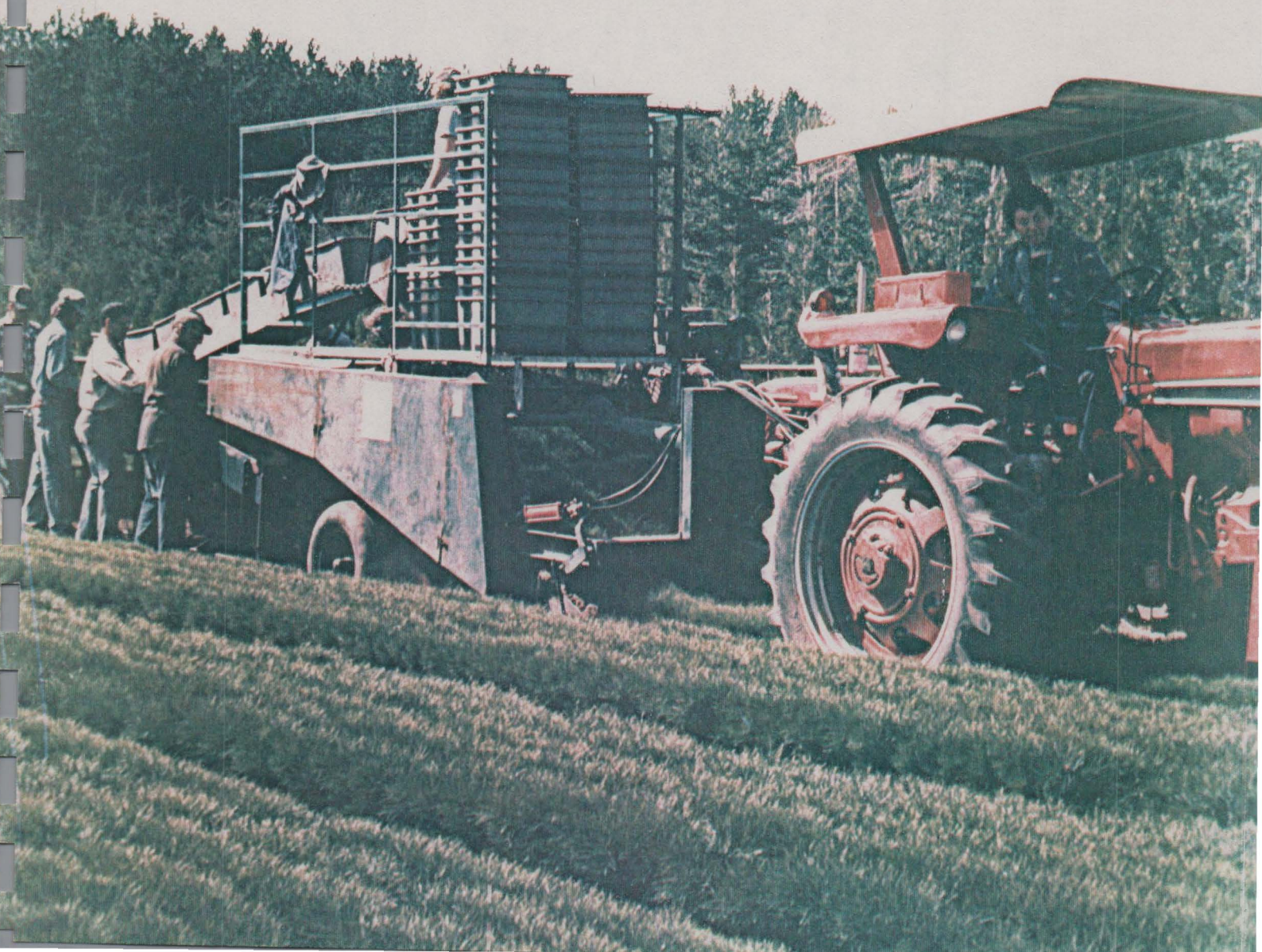

1984 FOREST PEST MANAGEMENT NURSERY REPORT

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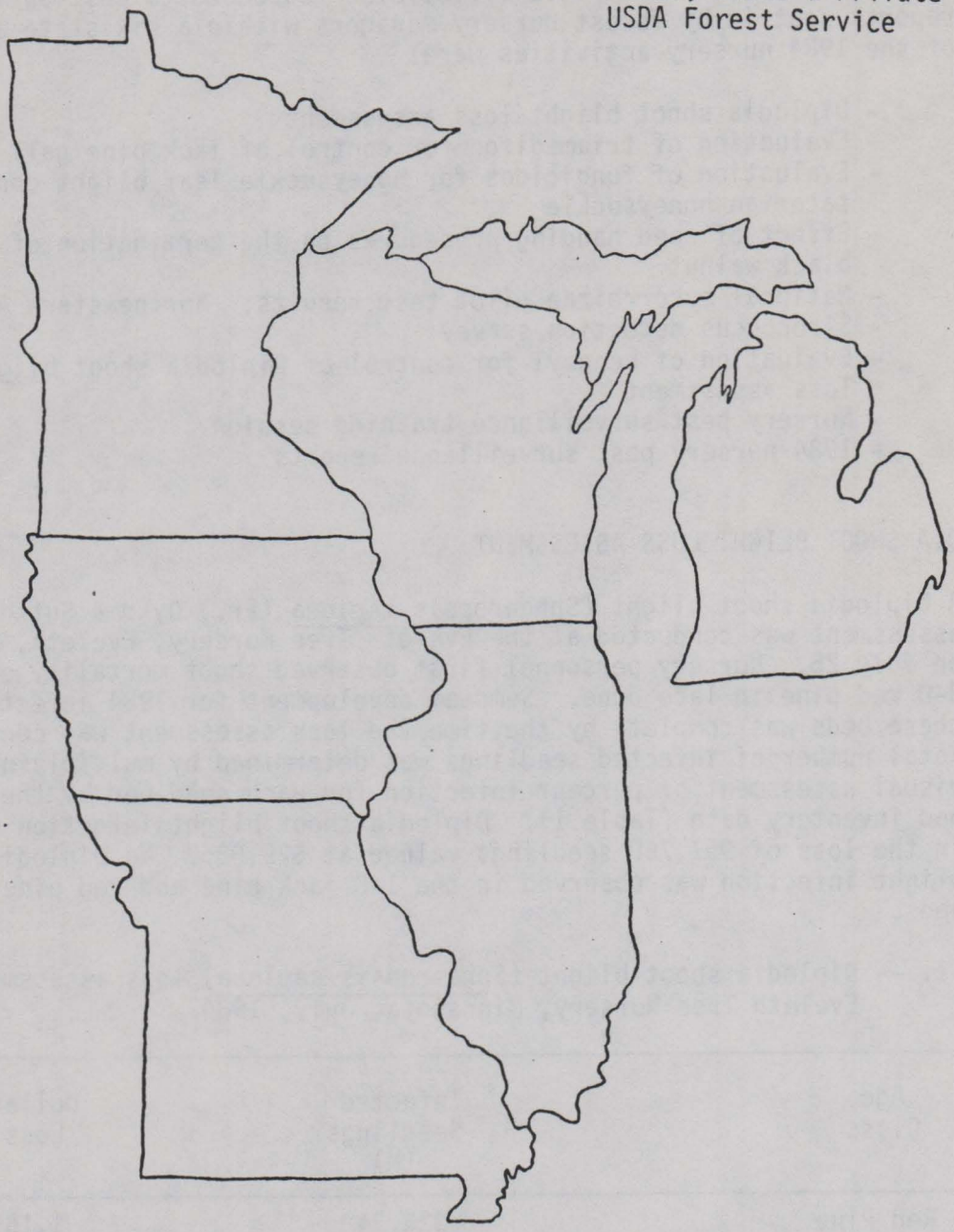

Cover Photo: Spring lifting at the Eveleth Tree Nursery

INTRODUCTION

Forest Pest Management (FPM) nursery activities in the St. Paul Field Office area during 1984 included direct involvement with federal nurseries and cooperative projects with states, universities, and other federal agencies. The Field Office also responded to pest surveillance reports sent in by forest nursery managers within a six state area. Some of the 1984 nursery activities were:

- Diplodia shoot blight loss assessment
- Evaluation of triamedifon for control of jack pine gall rust
- Evaluation of fungicides for honeysuckle leaf blight control on tatarian honeysuckle
- Effect of seed handing procedures on the germination of black walnut
- National mycorrhizae pilot test results: Northeastern Area
- Sirococcus detection survey
- Evaluation of benomyl for control of Diplodia shoot blight and loss assessment
- Nursery pest surveillance training session
- 1984 nursery pest surveillance reports

DIPLODIA SHOOT BLIGHT LOSS ASSESSMENT

A Diplodia shoot blight (Sphaeropsis sapinea (Fr.) Dyko & Sutton) loss assessment was conducted at the Eveleth Tree Nursery, Eveleth, Minnesota on July 26. Nursery personnel first observed shoot mortality of 2-0 and 3-0 red pine in late June. Symptom development for 1984 infections in these beds was complete by the time the loss assessment was conducted. Total number of infected seedlings was determined by multiplying the visual assessment of percent infection for each seed bed by the 1983 seed bed inventory data (Table 1). Diplodia shoot blight infection resulted in the loss of 951,760 seedlings valued at $29,035. No Diplodia shoot blight infection was observed in the 1-0 jack pine and red pine seedling beds.

Table 1. -- Diplodia shoot blight (Sphaeropsis sapinea) loss assessment at Eveleth Tree Nursery, Minnesota, July, 1984.

Age Class	Infected Seedlings (M)	Dollar* Loss
2-0 Red Pine	325.24	1,159
3-0 Red Pine	558.40	17,958
2-0 Jack Pine	68.12	1,918
TOTAL	951.76	29,035

* Stock value based on estimates provided by Robert Gutsch, Nursery Manager.

Control

Windbreaks: Successful control of Diplodia shoot blight in nurseries requires reduction of inoculum in both the seed beds and windbreaks. Windbreaks can harbor S. sapinea in shoot and stem cankers, as well as saprophytically on red pine cone scales. This latter type of infection will go unnoticed as there are no overt symptoms on windbreak trees.

An examination of the infection pattern at Eveleth showed that infection was heaviest in those beds located at the west end of blocks and adjacent to red pine windbreaks. Although there were no stem cankers or shoot blight symptoms in the windbreaks, examination of cone scales showed abundant S. sapinea infection.

To reduce the hazard of future Diplodia shoot blight outbreaks, a plan to replace the red pine windbreaks at the Nursery should be developed. This is particularly important for red pine windbreaks located at the west end of the nursery blocks.

Beds: Once Diplodia shoot blight infection has become established in a nursery bed, active control is required. Light infection in 1-0 red pine and jack pine beds, and in 2-0 red pine beds can be rogued. This will reduce the hazard of inoculum build up the following growing season. However, heavy infections of these age classes will require a chemical control program. While both Bordeaux mixture and benomyl will control this disease, the latter is easier to work with and gives better control. Applications of 0.5 lb a.i./acre benomyl every two weeks during bud break and shoot elongation will control spread of the disease in 2-0 and 3-0 seedling beds.

Infections observed in the 2-0 jack pine and 3-0 red pine growing seasons do not require control because by the time infection is evident little can be done to reduce current year losses. These beds will be lifted prior to the next infection period, and damaged seedlings can be easily culled during the packing process.

First year seedlings (1-0) should be protected with a fungicide if Diplodia infections are abundant within the nursery and/or light 2-0 and 3-0 infections adjoin the 1-0 seed bed area. Benomyl applied once every two weeks while buds are forming will give control. Lightly infected 1-0 beds should be rogued at the end of the growing season or before shoot elongation begins the following spring. This may eliminate the need to apply a protective fungicide during the second growing season.

The control recommendations outlined here were developed by Dr. Marge Palmer at the North Central Forest Experiment Station (NCFES). A more detailed summary of her work is available through the NCFES or the St. Paul Field Office.

EVALUATION OF TRIADIMEFON FOR CONTROL OF JACK PINE GALL RUST

An evaluation of foliar applications of Bayleton® 50WP (triadimefon) for control of jack pine gall rust began in summer of 1983 at the General Andrews Nursery, Willow River, Minnesota and the Hayward Nursery, Hayward, Wisconsin. Both nurseries had reported seedling cull due to main stem galls. Based on previous gall rust surveys, these galls were believed to be caused primarily by pine-oak gall rust (Cronartium quercuum f. sp. banksianae).

Bayleton-treated 2-0 jack pine seedlings were evaluated for first year gall rust infections at both nurseries. Application of 4 oz Bayleton/A/100 gal water did not give control; the percent of infection between control and treated stock were not significantly different at either nursery.

A technique for greenhouse inoculation of jackpine seedlings with the pine-oak gall rust fungus was recently developed at the Univerisity of Minnesota School of Forestry by Keith Stewart. In cooperation with Mr. Stewart, FPM conducted a greenhouse evaluation of three rates of Bayleton for control of pine-oak gall rust. The evaluation confirmed our field observation that the 4 oz application rate does not give control. However, the 16 oz rate resulted in significantly fewer gall rust infections. Further evaluation of this and several intermediate rates is underway. Results of this work will be used to determine an appropriate field evaluation rate for 1985.

EVALUATION OF FUNGICIDES FOR HONEYSUCKLE LEAF BLIGHT CONTROL ON TATARIAN HONEYSUCKLE, 1984

A fungicide trial for control of honeysuckle leaf blight (Herpobasidium deformans Gould) was conducted at the Iowa State Nursery in cooperation with Dr. Laura Sweets of Iowa State University. This disease was prevalent at the nursery in both 1982 and 1983. A randomized block design was used to apply fungicides (Fore 80WP®, Kocide 101® 77WP, Citcop 4E®, Bayleton® 25WP, Benalate 50WP®, and Daconil 2787®) to 2-0 honeysuckle grown in four broadcast seeded beds.

Honeysuckle leaf blight did not develop in the beds until mid-June. For the remainder of the season the disease was severe throughout all beds and plots. Based on the rating system used to evaluate this trial, Daconil 2787 gave the best disease control of the fungicides tested. However, even with 11 applications of Daconil 2787, an average of 51-80 percent of the foliage on treated plants showed symptoms of honeysuckle leaf blight. Dense spacing of plants in beds, abundance of inoculum, and weather conditions favorable for disease development may have contributed to poor disease control by all fungicides tested.

A more detailed report of this work is available from the St. Paul Field Office.

THE EFFECT OF SEED HANDLING PROCEDURES ON THE GERMINATION OF BLACK WALNUT

For many years the germination of black walnut (Juglans nigra L.) in nurseries of the north central region of the United States has been poor. This has resulted in the production of fewer seedlings than desired. Analyses of the nursery beds to find a causal agent for the low germination have not led to a solution of this problem. Proper seed handling procedures are critical to maintain high seed viability. Therefore, a logical next step to resolving the problem of low nursery germination was to evaluate the seed handling procedures. The Minnesota Department of Natural Resources, in cooperation with the USDA Forest Service, National Tree Seed Laboratory and the USDA Forest Service, Northeastern Area, State & Private Forestry, began an investigation of seed handling procedures in the fall of 1983.

Personnel of the Minnesota Department of Natural Resources collected samples of walnuts at 5 steps in the collection and handling process. These steps were:

1. Nuts arrive at the buying station. This collection established a baseline of nut viability.

2. Loading at the buying station for transport to the nursery. This sample allowed for measuring loss of viability at the buying station.

3. Arrival at the nursery. This sample allowed for measuring viability loss while in transport to the nursery.

4. After husking. This sample allowed for measuring the effect of the husker on viability.

5. Sowing time. This sample allowed for measuring the effect of temporary storage between husking and sowing.

When a significant drop in germination occured following a specific handling process, it was interpreted mean the step had a deleterious effect on the seed viability. The results suggested that the husking process is deleterious to germination. Average germination of the 3 samples before husking was 48.4 percent, while average germination of the 2 samples after husking was 26.0 percent. Unfortunately, the results were not conclusive because the last after-husking sample of walnuts had germination equal to that of the first before-husking sample. There was little difference among the lots in speed of germination. All the lots reached approximately 90 percent of their total germination in 28 to 35 days.

From these data the exact cause of the low germination of black walnut in nurseries has not been identified. However, the large average drop in germination after husking indicated that the evaluation should be continued to conclusively determine if handling procedures are the cause of the low viability. Similar samples were collected in 1984 and are currently being analyzed.

A more detailed report of these results is available from the St. Paul Field Office or from Robert Karrfalt at the National Tree Seed Laboratory, Dry Branch, Georgia.

NATIONAL MYCORRHIZAE PILOT TEST RESULTS: NORTHEASTERN AREA

In the late 1970s, the Northeastern Area (NA) became involved in the National Mycorrhizae Pilot Test. The objective of this study was to evaluate the performance of stock inoculated with Pisolithus tinctorius (Pers.) Coker and Couch (Pt), both in nurseries and subsequent outplantings. Nine NA nurseries were initially involved in the pilot test; however due to inadequate mycorrhizal development, two nurseries did not participate in the outplanting study.

The nursery phase of the project was completed in 1980 and summarized by Marx et al.[1] Growth measurements were taken one, two, and four years after outplanting. Fourth year growth data are available for all but one site (Jonesboro, IL). No significant differences ($P = .05$) in seedling survival were noted between Pt inoculated and uninoculated plots at any of the seven planting sites. At the end of the first growing season, three sites showed significantly greater plot volume index (PVI = caliper^2 (cm^2) x seedling ht (cm) x number surviving seedlings) for inoculated stock over uninoculated stock. This difference persisted into the second growing season at two sites. However, by the end of the fourth growing season, no significant difference in PVI was found at any of the test locations.

The Pt isolate used in the pilot test originated in the Southeastern U.S. Although this fungus forms abundant mycorrhizae with a number of southern pine species, the pilot test results did not show similar success with pines in the northeastern U.S. It is possible that the particular isolate used in the pilot test was not well adapted to northern temperatures and/or tree species. A northern isolate of this fungus or other endemic fungi might be better suited for northern mycorrhizae inoculation programs.

A more detailed discussion of the results presented here is available from our Field Office (Field Note 85-1).

SIROCOCCUS DETECTION SURVEY

A detection survey was conducted for Sirococcus shoot blight (Sirococcus strobilinus Preuss) on red pine surrounding Toumey Nursery in Watersmeet, Michigan. Light infections were found on only 2 trees. They did not require removal, but their presence was noted for reference in future surveillance work.

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[1] Marx, D., C. Cordell, D. Kenny, J. Mexal, J. Artman, J. Riffle, and R. Molina. 1984. Commercial vegetative inoculum of Pisolithus tinctorius and inoculation techniques for development of ectomycorrhizae on bare-root tree seedlings. Forest Science Monograph 25, Supplement to For. Sci. 30(3), 101 p.

In 1980, when the first Sirococcus survey was conducted at Toumey Nursery, 21 trees were identified that required removal or pruning. Nursery personnel clearly have done an excellent job of reducing the hazard of Sirococcus infection within the Nursery.

EVALUATION OF BENOMYL FOR CONTROL OF DIPLODIA SHOOT BLIGHT AND LOSS ASSESSMENT

In cooperation with North Central Forest Experiment Station personnel, an evaluation of benomyl (0.5 lb a.i./A) for control of Diplodia shoot blight was conducted on 2-0 red pine at the General Andrews Nursery in Willow River, Minnesota. Although infection in the nontreated beds was low (1.5%), the Diplodia infection in the treated areas was reduced (0.7%). These results and those gathered at the Wilson Nursery, Boscobel, Wisconsin in 1983 (see 1983 Nursery Report) suggest that the lower benomyl rate will give control.

In spring 1984, an assessment of losses to 1983 Diplodia shoot blight infection was conducted in Block C at the General Andrews Nursery in cooperation with the Minnesota Department of Natural Resources. The average percent infection in the west end of Block C was 56.8. However, the average difference between the 1983 and 1984 inventories was only 26 percent. This suggested that the 1983 inventory was conducted after some seedlings were showing symptoms. These symptomatic seedlings were probably not included in the 1983 viable seedling counts, but were counted in the losses to Diplodia.

NURSERY PEST SURVEILLANCE TRAINING SESSION

A nursery pest surveillance training program was initiated in 1983 at the St. Paul Field Office in cooperation with the Minnesota Department of Natural Resources. The goals of the program are to: 1) increase awareness of early signs and symptoms of pests before they reach epidemic levels, 2) encourage nursery personnel to think about their role in nursery pest management, and 3) increase familiarity with pesticide safety. In 1984 the nursery pest surveillance training program was presented in cooperation with the Michigan Department of Natural Resources at the Wyman State Nursery in Manistique, Michigan.

It is our firm belief that pest surveillance and early detection by nursery personnel is the key to a successful nursery pest management program. Pest specialists should be called in when a pest is detected, but it is the people who are in the nursery beds daily that have the best chance of detecting a pest population before it erupts into a major problem.

1984 NURSERY PEST SURVEILLANCE REPORTS

During 1984, 20 requests for diagnosis of nursery pest problems were received. The requests are listed below by nursery, host species, and pest.

NURSERY	TREE SPECIES	PEST/COMMENT
Badoura State Nursery, MN	Jack pine	Gall rust
Chippewa Farms Nursery, MN	Spruce	Botrytis blight
Eveleth, Superior NF, MN	Jack & red pine	Diplodia shoot blight
	Red pine	Mechanical root injury
	Red pine	Pine woolly aphid
	Red pine	Tip borer (Retinia pallipennis) present, but no damage
Forjay Nursery, Circle Pines, MN	White spruce	Fungus gnats
	White spruce	Saprophytic mushrooms
General Andrews State Nursery, MN	Red pine	Diplodia shoot blight
	Honeysuckle	Herpobasidium leaf blight
	Jack pine	Gall rust
Hayward State Nursery, WI	Red pine	Stunting and root rot
	Jack pine	Gall rust
Iowa State Nursery	Honeysuckle	Herpobasidium leaf blight
Itasca Greenhouse, Cohasset, MN	Red pine	Root rot - unknown cause

NURSERY	TREE SPECIES	PEST/COMMENT
Lake Superior Nursery, MI	Scots & red pine	Stunting
Red Lake Indian Reservation Greenhouse, MN	Red pine	Root rot - unknown cause
	Red pine	Rodent damage
Toumey Nursery, Ottawa NF, MI	Red pine	Winter injury
	Apple	Powdery mildew